

WHAT IS CLAIMED IS:

1. A disk drive having a perpendicular magnetic recording system, said disk comprising:

5 a disk medium in which a magnetized area corresponding to data recorded with said perpendicular magnetic recording system is formed in a perpendicular direction with respect to a medium surface; and

10 a head configured to conduct a read and write operation of the data with respect to said disk medium;

15 wherein said disk medium has a servo area in which servo data used for the position control of the head is recorded, and servo data coded with the DC free code is recorded on the servo area.

2. The disk drive according to claim 1, further comprising;

20 a read channel configured to conduct signal processing of a read signal read with said head from said servo area of said disk medium;

25 wherein said read channel extracts the read signal whose level changes depending upon the magnetization transfer position of said magnetized area and has a predetermined cut-off low frequency characteristic.

3. The disk drive according to claim 1, further comprising:

25 a read channel configured to conduct signal processing of the read signal read with said head from said servo area of said disk medium;

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wherein said read channel has a differentiation circuit for extracting a read signal whose level changes at the magnetization transfer position of said magnetized area and differentiating said read signal.

5 4. A disk drive having a perpendicular magnetic recording system, said disk drive comprising:

a disk medium on which the magnetized area corresponding to data recorded on said perpendicular magnetic recording system is formed in a perpendicular direction with respect to the medium surface;

10 a head configured to conduct a read and write operation of the data with respect to said medium; and

15 a read channel having a predetermined cut-off frequency characteristic for extracting a read signal waveform whose level changes at a magnetization transfer position of the magnetization area from the read signal read with said head from said disk medium;

wherein said disk medium has a servo area in which servo data is recorded which is used for the

20 positioning control of said head, and said servo data is recorded which comprises coded data in which the sum total of the length in the longitudinal direction of the area having a positive polarity of said magnetized area and the sum total of the length in the

25 longitudinal direction of the area having a negative polarity become equal to each other.

5. The disk drive according to claim 4, wherein

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5 said servo data has a servo address including a track address for identifying a track constituted on the disk medium.

10 6. The disk drive according to claim 4, wherein  
15 said read channel extracts a read signal waveform which  
changes in a step-like configuration at the  
magnetization transfer point of the magnetized area at  
the time of data decoding for decoding the recorded  
data from said disk medium with said head, and decoding  
20 the recorded data to the original recorded data with  
PRML method signal processing circuit.

25 7. A disk drive having a perpendicular magnetic recording system, said disk drive comprising:

15 a disk medium on which magnetized area  
corresponding to data recorded on said perpendicular  
magnetic recording system is formed in a perpendicular  
direction with respect to the medium surface;

20 a head configured to conduct a read and write  
operation of the data with respect to said medium; and

25 a read channel having a predetermined cut-off  
frequency characteristic for extracting a read signal  
waveform whose level changes at a magnetization  
transfer position of the magnetization area from the  
read signal read with said head from said disk medium;

25 wherein said disk medium has a servo area in which  
servo data is recorded which is used for the  
positioning control of said head, the data comprising

5 coded data in which the minimum magnetization reverse interval time  $T_{min}$  of said magnetized area satisfies a condition such as a relationship of  $T_{min} \leq (-\ln N)/2\pi f_c$ , wherein  $N$  is a constant experimentally set on the basis of the read error rate.

10 8. The disk drive according to claim 7, wherein on the servo area servo data is recorded which is used for the positioning control of the head, the data comprising coded data which satisfies a condition such as said relationship, wherein  $N$  is 0.5 or more.

15 9. The disk drive according to claim 7, wherein the servo data has a servo address including a track address for identifying a track constituted on the disk medium.

10. A method of recording coded servo data in a disk drive having a disk medium and a head, the method comprising:

encoding servo data used for the positioning control of the head with a DC free code; and

20 conducting perpendicular magnetic recording of the coded servo data on the disk medium.

11. A method of recording coded servo data in a disk drive having a disk medium, a head, and a read channel, the method comprising:

25 said read channel having a low area shield characteristic of a predetermined shield frequency for extracting a read signal waveform whose level changes

at the magnetization transfer position of the magnetization region from the read signal read with the head from the disk medium,

wherein said read channel codes the servo data  
5 used in the positioning control of the head to coded data wherein the minimum magnetized reverse interval time  $T_{min}$  of said magnetized area satisfies a condition such as a relationship of  $T_{min} \leq (-\ln N)/(2\pi f_c)$  where  $N$  is a constant which is experimentally set on the basis  
10 of a read error rate; and

said read channel conducts the perpendicular magnetic recording of the servo data in the servo area on the disk medium.

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